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ABSTRACT

This evaluation guide resulted from a 2-year project that conducted literacy audits at 10 manufacturing companies, assessed 3,291 workers, developed customized assessments and curricula, and provided 104 courses to 948 participants in the Chicago area. The guide is a hands-on resource to assist companies, unions, or educational agencies in setting up a system for measuring the effectiveness of a basic skills program. Using examples from the project, the guide covers the following topics: (1) the need for basic skills in the manufacturing industry; (2) issues in evaluating basic skills programs; (3) program evaluation; and (4) the four levels of program evaluation (reaction, learning, transfer of learning, and organizational impact). Samples for conducting each level of program evaluation are provided. Contains 11 references. (KC)

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ED 373 261

Evaluation Guide

for

Workplace Basic Skills Programs

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Introduction

Project Overview

"Workplace Literacy in a Total Quality Management Environment for the Manufacturing Industry" was funded by the U.S. Department of Education to provide workplace literacy instruction to ten manufacturers in the Chicago area. It was in operation from the period May 20, 1992 - May 31, 1994. During that time, it conducted literacy audits at all ten companies, assessed 3,291 workers, developed customized assessments and curricula, and provided 104 courses to 948 participants.

Profile of Manufacturing Partners

The ten participating companies ranged in size from 200 employees to 1500. About half of the companies were unionized. All were involved in some form of Total Quality Management initiative. The most frequent quality strategies were adoption of Statistical Process Control (SPC), re-organization into work teams, and employee involvement.

Profile of Employees

The employees who participated in the program were 45% male and 55% female. The largest group of workers were Hispanic (49%), followed by White (28%), Asian (14%) and Black (8%). The majority had been employed by the company between 1 - 5 years. Approximately 30% had been employed more than 11 years.

Profile of Services

Of the 104 courses, 33 were ESL, 28 were reading/writing, 35 were math, 2 were oral communication for customer interaction, and 6 were GED. All courses were customized to the needs of the individual company and the curriculum was competency-based, functional context. Average class size ranged between 7 - 10 employees. Ninety percent of the companies offered the courses on either 50% or 100% work time.

Purpose of this Guide

This guide is written from the perspective of our experiences as basic skills providers. Our intended audience is the practitioner, be it company, union or educational agency, who is looking for a hands-on resource to assist in setting up a system for measuring the effectiveness of a basic skills program. Our discussion in this guide reflects our actual experience which is limited to the manufacturing industry and to functional context, basic skills programs. We have incorporated examples of results and our actual tools wherever possible. Because we feel that experience is cumulative and results from other projects drove our evaluation design in this project, we referenced other companies' experiences as well as the experiences from this particular project.

Observations about basic skills programs

Having been involved with planning and implementing basic skills programs at more than 100 manufacturing companies, we have made five key observations about the environment under which companies and the basic skills programs must operate.

1. **The basic skills of the workforce are critical to the ability of the manufacturing industry to transform itself into "world-class manufacturers."**

This implies there is an immediate need for basic skills programs whose outcomes are tied to the transformation to world-class manufacturers in as short a time as possible.

2. **Manufacturing companies have limited resources and time to successfully make this transformation.**

The transformation often involves the purchase and use of expensive technology, extended training in technical areas which requires a commitment of time off the floor as well as expense, development and adoption of quality standards and tools for measurement, and a philosophy of quality which is disseminated throughout the organization. No one company has sufficient people, time, and financial resources to accomplish all these objectives in the short-term. Priorities must be set, and in setting those priorities, basic skills programs must compete for the company's limited resources, as well.

3. **Manufacturers operate in a very dynamic environment.**

There are continual and often unpredictable changes in the nature of the business, technology, competition, products, production flow, work orders, and the workforce. Such changes require that a basic skills program is flexible.

4. **Basic skills programs are not an entity unto themselves - rather they are an integral part of the entire company and penetrate all the company's functions.**

Basic skill programs are affected by all the dynamic events which take place. If a company is downsizing, program attendance will be affected. If overtime is required to complete orders, attendance will likely decline and the program may be temporarily suspended. If pay for knowledge/skills is going to be implemented, the desired level of basic skills may become one of the benchmarks. New hiring policies may reflect the desired level of basic skills as indicated by the literacy audits. Implementation of SPC in the near future will make math assessment and training a priority. Successful participation and completion of the program may become a part of the performance appraisal and promotion processes. These are but a few examples of how the basic skill program interfaces with the company.

5. Evaluation permeates all business operations as the management must decide in which efforts to place its limited resources.

The goal of the company is to make a profit and to allocate that profit in such a manner as to continue the existence and survival of that organization. As such, there is competition for all resources. While "basic skills programs" are a "nice thing to do", they must, by their very nature and by the nature of the organization, prove their value against the value which could be provided by other initiatives.

The Need For Basic Skills in the Manufacturing Industry

Global competition in price, on-time delivery, and improved quality have forced the American manufacturing industry to change dramatically by adopting a Total Quality Management (TQM) approach. Expectations of production workers have increased as the demand for high productivity, zero defects and new technology impacts the factory floor. Workers are being asked to contribute ideas; to learn new skills such as Statistical Process Control (SPC), cellular manufacturing, and geometric tolerancing; to actively participate in team production and joint problem-solving; and to become cross-trained in a variety of jobs within their respective departments. In order to effect these changes, the workforce MUST have the basic math, reading, writing, and language skills.

Successful adoption of TQM depends on a number of factors, but company-wide training of the workforce is one of the most important factors. As a manufacturer changes its approach from traditional manufacturing to a world class company, it is the basic skills level of the workforce that will determine whether or not that transition will be successful. The chart on the next two pages summarizes the current manufacturing practices of today and sample basic skills that are necessary for attaining the practices of the future.

Basic Skills Within Manufacturing

Manufacturing Today	Sample Basic Skills	Manufacturing of Tomorrow with TQM
Problem-solving and decision-making that is limited to management.	Read flowcharts. Think critically. Read and construct fishbone cause-effect charts. Read and construct check sheets. Write descriptions of problems and possible solutions.	Team problem-solving and decision-making that is driven throughout the organization.
Flow manufacturing.	Read individual customer spec sheets. Read production charts and directions which change daily. Maintain job cards and records of production. Fill out forms for requisitioning raw materials for customized orders.	Just-in-Time manufacturing. Materials Resource Planning.
One person-one job.	Oral communication skills to participate in training. Read training materials. Complete tests/assessments.	Cross-training—skilled in a variety of jobs. Manufacturing work cells.
Little or no employee involvement in the management of the company.	Orally participate in meetings. Read agendas and meeting notes. Take notes in meetings. Complete survey forms. Complete process forms.	Employee involvement throughout the organization.
Working directly under a supervisor.	Oral communication skills such as giving instructions, giving advice, solving problems, negotiating, giving positive or constructive feedback, etc.	Working in teams.
Low technology.	Read technical manuals. Read computerized directions. Oral communication skills to participate in technology training.	High technology. Sophisticated equipment. Use of computers.
Reliance on inspection department for quality.	Calculate production and rejects. Fill out charts. Analyze data. Measure in metric. Calculate with whole numbers, decimals and fractions. Write summaries of trends and events.	Employees who inspect their own work, use Statistical Process Control and the implementation of other quality strategies.

Basic Skills Within Manufacturing

Manufacturing Today	Sample Basic Skills	Manufacturing of Tomorrow with TQM
No certification—each company has a variety of suppliers and customers with little or no demands for formalized quality procedures.	Orally describe job processes. Orally describe purpose and nature of company. Read flowcharts. Read work procedures. Write work procedures.	Quality audits. Supplier certification. ISO 9000.
Training limited to middle and upper management.	Read training manuals and materials. Listen and take notes. Ask and answer questions. Write in-training exercises. Take tests. Give oral and written feedback on the success of the training. Participate in problem-solving.	Training is essential for all workers.
Limited or no interaction with customers.	Oral communication skills to request feedback, understand suggestions, etc. Read written reports and customer survey responses. Correspond with customers.	Both internal and external customer interaction.
Pay for seniority or by job category.	Oral communication skills to participate in training. Read training materials. Take notes. Complete tests/assessments.	Pay for skills and knowledge.
Primarily company-initiated safety procedures.	Read Material Safety Data Sheets. Read safety bulletins. Fill out safety reports. Orally participate in safety training. Read safety training materials. Read government documents. Participate in safety committees.	Increased government regulations and formal procedures for safety and disposal of hazardous materials.

The road to world-class manufacturing is long and the trip is expensive. Because of the broad nature of the various initiatives needed to be successfully undertaken, a company must carefully plan its route. Expediency is critical; as is an integrated, coordinated, efficient effort to undertake all the initiatives.

Evaluation of the progress and success of each initiative is necessary to validate efficiency and expediency. As such, it is the purpose of this guide to share experiences and explore best practices leading to the design of a practical approach to measuring the effectiveness of basic skills programs in the manufacturing industry.

Issues in Evaluating Basic Skills Programs

There are numerous issues facing a business/education provider partnership in evaluating the success of the basic skills program. Listed below are nine of the most common issues which the project has faced.

1. Different goals of a basic skills program.
In the experience of the project, there have been three distinct goals for the programs: 1) to enhance and accelerate the successful implementation of new initiatives, 2) to improve productivity in the short-term, and 3) to enrich and expand the overall educational level of the workers for both the workplace and for their personal lives. While a program may have multiple goals, at least one of the above is the primary goal. It is important to identify the goals because each goal will drive the design of the evaluation.

The first goal - to enhance and accelerate the successful implementation of new initiatives - has been the primary goal for the majority of our partnering companies. In this project, the most frequent initiatives have been the development of a Total Quality Management (TQM) system, adoption of Statistical Process Control (SPC), re-organization into work teams, and continuous process improvement. Measuring the impact of the basic skills program in adopting new initiatives is difficult because there is no baseline data.

The second goal - to improve productivity in the short-term - implies that there is a measurable problem which basic skills training can solve. If this is a major problem, there are likely to be a variety of interventions taking place because of the urgency of the problem. For example, a safety problem exists because the workforce lacks the English to comprehend the safety rules. To resolve the problem the company can translate the rules into the workers' native language or provide safety training in the workers' native languages. These interventions can take place sooner than providing English training to all workers. If all three interventions occur and the accident/injury rate decreases, which intervention gets the credit? If the program is voluntary, it is even more difficult to attribute the decline in the injury rate to the presence of the basic skills program.

Having worked with more than 100 companies in a five-year period, there exists only one instance where there is a concrete example of improving productivity in the short-term. In this instance, a customized assessment was developed and a minimum score determined. The assessment was made mandatory, as was participation in the program until the designated score was attained. Since no other changes took place at the worksite during the 6-month program, positive changes in scrap and waste were attributed to the program.

2. Changing goals.

Goals for the program may change during the project. This affects the amount of available data.

- Company A started as a voluntary, enrichment program. As management began to recognize the need for basic skills as a means for successful implementation of new initiatives, the program became mandatory. This change took place in the final months of the project. Therefore, time was not available to collect enough data to demonstrate organizational impact.

3. Changing company factors.

A variety of factors within the company affect the presence as well as the potential success of the basic skills program. A few of these factors are changes in management, changes in the actual workforce (layoffs or hiring), upturns or downturns in production, customer demands, or new initiatives. Each can affect the goal and structure of the basic skills program as well as the evaluation design. The following are examples of how changing company factors affected the basic skills program during an eighteen-month period:

- Company A management made a commitment to basic skills training and strongly encouraged assessment/participation with 100% release time. Projected number of courses was 12.

  Company-wide assessment was completed and two courses were offered. A new production manager halted all training for more than 6 months. When another production manager took over, all training was re-initiated, and more than 14 courses were offered in the next 12 months.

- Company B management made a commitment to basic skills training. Participation in both the assessment and training was voluntary. All courses were offered on work-time. The company began changing from a single factory to four focus-factories, ISO 9000 was being applied for, and a pay for skills program was being designed. The company reduced the release time to 50%. Later the company reconsidered the value of the basic skills program. After the three initiatives were achieved, the company, in discussion with the provider, determined that assessment and participation in training would be mandatory and that training would be held on 100% work-time.

- At the time of the application for Federal funds, Company C was committed to a basic skills program with 50% release time. During the nine month waiting period before beginning the program, business took a downturn and there were some changes in management. One course was offered but on voluntary time. A severe thunderstorm then destroyed a large portion of the factory and major repairs were a priority. Participation dropped and the program was discontinued.

4. Absence of data.

While all companies have some productivity data, the data may be insufficient to track. Alternatively, companies may be expanding or changing their data collection system and it will be difficult to track the data during the time of the basic skills program.

5. Inability to track the data to the program.

When data is available, it may not be possible to track the data to the individuals participating in the program. Data regarding productivity or personnel measures is usually company-based or department-based. In the situation of work teams, the data is usually team-based. If participation in the basic skills program is voluntary, it is difficult to track and attribute any changes in the data to the success of the individuals in the company. One example is:

- In Company A, participation in the program was voluntary. All data regarding productivity was team-based. No teams had significant participation in the program to attribute productivity changes to the program.

6. Numerous factors affecting any changes.

In as much as manufacturing companies are very dynamic, many changes can take place at the same time.

- Company A began an SPC program to satisfy one of their major customers. Math classes began after a skill gap was identified. A month later, a gainsharing program was announced, and with a 60% non-English-speaking workforce, it was decided that English classes would be important. Within the next four months, the company added capital equipment while introducing a new product, and lost nearly 20% of the business from the customer that requested SPC from its suppliers.

7. Lack of consensus on the need or value of the program.

Support for the program must be company-wide. If management supports the program but supervisors do not, workers may not be encouraged to attend or even released to attend classes. Support for the program must also come from the workforce itself. If attending class increases the workload of the nonparticipating workers, the support and encouragement for those participating in the program may not be there.

8. Nature of the program - voluntary vs. mandatory.

In voluntary programs, those who come forth to participate may not be those workers who need the training the most. Hence, changes in productivity may not be noticeable. On the other hand, while all workers with minimal skills may be mandatorily sent to training, a poor attitude may prevent the workers from learning or even discourage others from learning.

9. Limited time & resources.

A company may not be able to afford sufficient release time for noticeable organizational impact.

- Company A has a workforce of 2500. Management has determined that the maximum number of basic skill classes that production can afford during the year is eighteen and that classes have to be spread over several departments and shifts. Because the training is spread over the entire company, impact is <u>impossible</u> to measure during the first year.

Program Evaluation

The focus of this guide is on the evaluation of a functional context program, that is, the determination of how well the entire program is functioning. The project has discovered that the most useful framework for evaluating programs is Kirkpatrick's four-level hierarchy which was also referenced in the U.S. Departments of Education and Labor publication The Bottom Line: Basic Skills In The Workplace. These four levels consist of 1) participant reaction, 2) participant learning, 3) participant performance, and 4) organizational results.

The first level, **participant reaction**, measures the participants' perceptions about the course as well as the program. Typical tools for measuring this level are what the field commonly calls "smile sheets" - the five point, Likert-scale rating questionnaires, and open discussion or interviews with the participants.

The second level, **participant learning**, measures the amount of learning which has taken place during the course or during the program. The most commonly used tool is the pre/post assessment.

Level three and four become more complicated in the hierarchy. The third level, **participant performance**, attempts to measure the transfer of learning from the course to the actual workplace. This level is critical because of the old adage, "You can lead a horse to water, but you can't make it drink." While a program can teach knowledge and skills, the question is whether or not that knowledge or these skills will be applied to the job. If a worker has demonstrated that he or she has learned to read a job aid, will that worker then refer to that job aid on the job, or will that worker continue to ask a co-worker about the information contained in that job aid? It is this third level which attempts to document the answer, to the question of the application of those skills. Common tools for this level include supervisors' interviews or questionnaires, job observation with performance checklists, and self-appraisal.

Level four, **organizational impact**, presents the biggest challenge to basic skills programs. This level focuses on the impact of the basic skills program on the company. The success of measuring the impact depend on four major factors: 1) the presence of quantifiable data, 2) the access to such data, 3) a solid relationship between the data and the basic skills program, and 4) an absence of other factors which could also affect the data. Examples of data include *production data*, such as productivity, scrap, customer complaints, cost, and quality measures and *workforce data* such as performance reviews, accidents/injuries, promotions, and absenteeism.

The chart below summarizes these four levels. Further discussion on the purpose, advantages and disadvantages, and actual tools used by the project can be found in the next four chapters.

Four Levels of Evaluation

Level	Purpose	Instruments/Data
REACTION	Obtain learner's input on the content, approach, and outcomes of the instruction	✦ "1-5" questionnaires ✦ Open-ended questionnaires ✦ One-on-one interviews ✦ Focus groups
LEARNING	Measure the amount of learning	✦ Pre-post tests ✦ Competency checklists
TRANSFER OF LEARNING	Measure the learning which has been transferred to the job	✦ Performance checklists ✦ Surveys - workers, supervisors, managers ✦ Interviews - workers, supervisors, managers
ORGANIZATIONAL IMPACT	Measure the program results on the company	✦ Production data: complaints downtime errors productivity ✦ Workforce data: absenteeism/tardiness grievances performance reviews promotions suggestions requests for assistance with personnel issues

Level 1: Reaction

If a basic skills effort is to be sustained in any company or organization over a long period of time, then it must have an effective evaluation component. "How much value has it added to the organization?" is the critical question.

It is well accepted that at the first level the most frequently used method of evaluation is participant reaction. Instruments that were used to measure participant reaction asked the fundamental question, "How did you like the basic skills program?" It is probably true that many organizations will not continue a basic skills initiative over a long period of time without demonstrating transfer and impact. The case for direct transfer and most certainly impact is difficult to establish for basic skills programs especially in the short term. Reaction evaluations, however, can get the program "over the hump." In their own right, and as has been the case in the companies in this project, participant reaction (or first level evaluations) are as important as, if not more important than, any of the other three types of evaluation, especially in the infancy of a program.

First level evaluations can have several purposes, and therefore several outcomes. First and foremost: they are indicators of customer satisfaction. Whether administered concurrently or after the completion of a course or program, they are a barometer of participant/organizational satisfaction. As a result of our experience in this project, it is our recommendation that, minimally, basic skills courses be evaluated on this level during, as well as after, the course is completed.

Participant surveys are the most frequently used tools to measure reaction. Since the purpose of the surveys is to obtain input and feedback on the appropriateness of the instructional activities and pace, the clarity and usefulness of the materials, the instructor's performance, and the value of the lessons, the surveys can be very useful in indicating a need for corrective action.

Focus groups are an additional tool that can be employed with surveys on first level evaluations. Several companies have utilized this method with great success. After the paper and pencil surveys were completed, the training manager conducted a focus group with the class covering the topical areas in the survey. Students who do not express themselves well in writing had an opportunity to share opinions orally. With the instructor absent, participants were also much freer with constructive comments as there was no fear of hurting anyone's feelings.

The value of first level evaluation data is that it provides corrective action opportunities. Until organizational impact can be determined and data made available, participant surveys are able to provide end user feedback that can sustain the basic skills initiative.

The following chart summarizes the strengths and weaknesses of each tool.

Tools for Measuring Reactions

Tool	Strengths	Weaknesses	Useful Under the Following Conditions
Mid-term participant survey	✦ Easy to administer and compile ✦ Forms can be customized ✦ Corrective action can take place before the course has ended ✦ Measuring the transfer of learning can begin ✦ Anonmyous responses	✦ Tendency for the "halo effect" ✦ Inadequate basic skills to complete the form ✦ Subjective ratings ✦ Reluctance on the part of some participants to give feedback	✦ Participants have the basic skills to complete the forms ✦ Data can be easily collected and quickly compiled
End of course participant survey	✦ Easy to administer and compile ✦ Forms can be customized ✦ Measuring the transfer of learning can begin ✦ Anonmyous responses	✦ Too late for corrective action ✦ Tendency for "halo effect" ✦ Inadequate basic skills to complete the form ✦ Subjective ratings ✦ Reluctance on the part of some participants to give feedback	✦ Participants have the basic skills to complete the forms ✦ Data can be easily collected and quickly compiled
Focus Groups	✦ Verbal responses ✦ Participants can build on others comments	✦ Not anonymous; some participants may be reluctant ✦ Participants need oral communication skills	✦ Participants have the oral communication skills to participate ✦ Participants are open and willing to share perceptions ✦ A skilled facilitator is available

Project recommendations:
While the project recognizes that each company is unique and a customized evaluation plan should be created for each company, certain tools and strategies have proven useful. In the experience of the project, we recommend the following:

1. Mid-course participant surveys should be utilized if time permits. (See Exhibit 1 for a sample.)

2. End-of-course participant surveys should be utilized. (See Exhibit 2 for an example which is appropriate for a beginning level of basic skills and Exhibit 3 for an example for participants with higher basic skills.)

3. Focus groups at the end of the course are very beneficial. (See Exhibit 4 for an example of participant feedback which resulted from the focus groups.)

Exhibit 1

Workplace ESL Mid-Term Training Survey

Company Name: _____ Date: _____

Instructor's Name: _____ Course: _____

We would like to know how you feel about the class at this time. Your answers to these questions will help us make improvement to the class.

		Yes	No
1.	Will the things you are learning be useful on the job?	_____	_____
2.	Does the instructor give good examples?	_____	_____
3.	Does the instructor help you if you have a question?	_____	_____
4.	Do you like the books and handouts that you are using?	_____	_____
5.	Do you spend enough time speaking English in class?	_____	_____
6.	Do you spend enough time reading English in class?	_____	_____
7.	Do you spend enough time writing English in class?	_____	_____
8.	Are you becoming more comfortable using English now?	_____	_____
9.	Has your use of English increased on the job? Explain.	_____	_____
	_____		
	_____		
	_____		
10.	Does your supervisor support your efforts to speak and read English better? Explain.	_____	_____
	_____		
	_____		
	_____		
11.	Has your use of English increased outside of work? Explain.	_____	_____
	_____		
	_____		
	_____		

12. Circle one then explain. Is this class ... Too easy? Too difficult?

_____

_____

_____

13. What do you like most about the class?

_____

_____

_____

14. What can the instructor do to help you learn more?

_____

_____

_____

15. Do you have any additional comments?

_____

_____

_____

Exhibit 2

COURSE EVALUATION FORM

Company/Course: _____

Instructor: _____

Schedule: _____

1. The course was:	Very good	Good	OK	Poor	Very poor
2. The materials were:	Very good	Good	OK	Poor	Very poor
3. The instructor was:	Very good	Good	OK	Poor	Very poor
4. My English in my job:	Improved a lot		Improved a little		Did not improve

5 Would you like to take another course? Yes No

6. Would you recommend this course to a co-worker? Yes No

7. What did you like about the course? _____

_____

8. What didn't you like about the course? _____

_____

9. What would you add to this course? _____

_____

Exhibit 3

TRAINING FEEDBACK SURVEY

COMPANY'S NAME_____ TODAY'S DATE_____

INSTRUCTOR'S NAME_____ COURSE_____

Thank you for participation in this training program. Please help make this course even better by sharing your ideas with us.

PART A: GENERAL QUALITY

DIRECTIONS: Please circle your responses to the following questions.

1. Did the things that you learned in this class help you on the job?	YES	NO
2. Did instructor give good, clear explanations?	YES	NO
3. Did the instructor know the course material?	YES	NO
4. Did the instructor give you help when you needed it?	YES	NO
5. Did the instructor make you feel comfortable and give you confidence?	YES	NO
6. Did the class usually start and end on time?	YES	NO
7. Was the class interesting?	YES	NO
8. Would you recommend this class to a co-worker?	YES	NO
9. Did your supervisor support your participation in this class?	YES	NO
10. Would you like to take another course?	YES	NO

PART B: RATED RESPONSES

DIRECTIONS: Please circle the response that best matches your opinion.

11. Overall, this class was	VERY GOOD	GOOD	O.K.	POOR	VERY POOR
12. The materials used were	VERY GOOD	GOOD	O.K.	POOR	VERY POOR
13. The instructor was	VERY GOOD	GOOD	O.K.	POOR	VERY POOR
14. The material presented was	TOO EASY		JUST RIGHT	TOO HARD	

PART C: DETAILED RESPONSES

DIRECTIONS: ***Please answer the following questions. Take time to think about your answers. Don't worry about your spelling or grammar --- we need your ideas.***

15. What did you like the most about this class? _____

_____

_____

_____

16. What did you like the least about this class? _____

_____

_____

_____

17. What can you do now that you couldn't do before you took this class? _____

_____

_____

_____

18. What changes would you suggest to make this class even better? _____

_____

_____

_____

THANK YOU FOR YOUR PARTICIPATION!

Exhibit 4

Focus Group Summary

Listed below is a summary of actual comments from focus group discussions at one company.

Figure 4- Participant Responses about Goals Met

Better communication now.
First time I wrote English.
I can understand more English and conversation.
I am able to state a problem, explain to supervisor and ask questions about safety.
I can understand department meetings.
I know what to say at meetings.
My vocabulary is better.
I know how to communicate with my supervisor and fellow workers.
I am not afraid to speak English to my supervisor.
I understand my job and meetings better and safety prevention.
I know how to communicate about accidents and prevent accidents.
I understand safety prevention-- example why we use safety glasses.
I am able to ask questions about safety.
I know how to take minutes.
I made my first CIP [suggestion] by myself and will write more.
Now I know how to write the CIP [company suggestion form] I have been working on.
I have written a CIP.
I am learning to trust myself. Next time I won't be afraid to write English.
I know the difference between past, present and future tenses.
Now I can read a traveler [job ticket] very well; where to go, what to look for and what I need.
At meetings I used to just listen, now I speak up and ask questions and give ideas.
I have a seven year old daughter. I was afraid to help her with her school work and now she tries to help me.
If I don't see my kids at home, now writing them notes.
The teacher helped me talk and understand.
I can tell about my job and I understand what other guys do in their department.
First time I came to class I know nothing; now I know a lot of words and about safety. Very nice.
I can use English and fill out an application.
Had 200 hours at an adult learning center. Now I know the difference. There I learned to read words. That wasn't reading. You're really teaching me to read.
Can read procedure sheets.
Can read instructions for pull aways [job procedure].
Know how to read and fill out a scrap card faster and don't have to ask as many questions.
Can explain scrap cards to others now.
Know how to read bar graphs and understand the goal line.
Can read instructions better.
Supervisor comment: Employee is learning about computers and is able to train others.

Level 2: Learning

The second level of evaluation attempts to measure the amount of learning that has occurred. Measuring what is taught in the classroom focuses on the content as well as the participants' progress. Again the issue is value.

The measurement of learning is undergoing its own sort of evaluation. The state-of-the-art workplace literacy programs are currently conducted within a functional context. Whether stated formally or not, courses are structured around competencies. How to measure the competency is one challenge, and how to measure participants' progress to a company that expects high value is quite another. The objective is to be accountable through accurate measurement and reporting. It is important that we, as educational providers, set realistic expectations, conduct training that focuses on competencies, and report results that describe a level of performance in behavior while maintaining confidentiality in order to demonstrate high value to the company.

Following is a discussion of measuring and reporting participant learning with three tools: pre/post assessments/percent improvement, module completion, and competency checklists.

Pre- and Post-Tests and Percent Improvement

Comparing pre,test and post,test results is used to answer the basic question, "Has learning taken place?" Measurement at this level is straightforward and based on empirical data.

Before training begins, an assessment is given (either a standardized tool such as the Test of Adult Basic Education (TABE), or a customized test) to measure participants' performance in a general area of knowledge. Training recommendations are made based on test results; however, the scores themselves remain confidential and are only revealed to each individual participant. The course content of each training session varies, according to the group's and participants' needs. Instruction is not geared to "teach to the test"; rather, course content is general in nature, with an emphasis put on workplace materials.

At the end of instruction, the same assessment (used as the pre-test) is given and the results are compared. The company is informed of the percent of improvement for each participant, but again, no scores are reported. Table 1 below shows how the Percent Improvement is calculated. An example of a customized assessment is presented in Exhibit 6. Table 2 provides a sample company report of Percent Improvement.

Table 1

Calculating Percent Improvement
Formula ..... (Post-test Score - Pre-test Score) / Pre-test Score

Examples

Participant A	Pre-test Score: 25 out of 30 Post-test Score: 30 out of 30 Calculation: (30 - 25) / 25 = .25 Percent Improvement = 25%
Participant B	Pre-test Score: 18 out of 30 Post-test Score: 30 out of 30 Calculation: (30 - 18) / 18 = .67 Percent Improvement = 67%
Participant C	Pre-test Score: 6 out of 30 Post-test Score: 15 out of 30 Calculation: (15 - 6) / 6 = 1.5 Percent Improvement = 150%

Table 2

Company XYZ
Training Effectiveness Report

Name	Percent Improvement	Further Training Recommended
John Doe	25%	No
Jane Smith	67%	No
Fred Jones	125%	Yes

The Percent Improvement Method is limited in the information that it provides. The only conclusion that can truly be based on this report is that the participant scored better (or worse) on the post-test than he did on the pre-test. Hopefully, this is due to the training and subsequent learning that took place in the Basic Skills course. However, as Dr. Thomas Sticht points out in his report entitled, "Testing and Assessment in Adult Basic Education and English as a Second Language Programs" (1990), the increase in scores may be due to other factors such as "warm-up," "surge," or "practice" effects.

Another problem in reporting learning gains in this manner is that it can be misleading, especially at a cursory glance. Taking a quick glance at Table 2, it would appear that Fred Jones had the best performance. (125% vs. 25% or 67%). However, careful consideration must be given to what the percent improvement represents. It is true that Fred had a greater increase in his assessment scores (pre vs. post); however, at the end of the course, he only was able to answer half of the assessment questions correctly. Both John and Jane received 100% on their final assessments.

Three advantages that this method of evaluation has over other methods is its simplicity, objectivity, and confidentiality. For these reasons it has remained a popular method of evaluating learning. However, this type of evaluation fails to meet the needs of the training program in several areas. First, it does not show the areas of knowledge that the participant has mastered, nor does it prescribe a course of training. Also, the results lend itself to misinterpretation as the reader confuses Percent Improvement with Percent Correct. For these reasons, a second method of learning evaluation can be used to either enhance or replace the pre/post test method.

Modules

In the Modules method of learning evaluation, the general body of knowledge contained in the pre/post test is broken up into subsets or modules. Each module contains items that cover a specific area of knowledge. For example, a 50-question math assessment may be broken into five separate modules:

1. Whole Numbers
2. Fractions
3. Decimals
4. Percents
5. Data Analysis

Benchmarks are set that identify the number of correct responses needed to indicate mastery of each module. Instead of a generalized statement such as "40-hours of math training recommended," a more specific training program is recommended for each participant based on his/her performance in each module. This prescriptive method of evaluation also provides a basis for a more efficient training program. Time is not spent on concepts that the student has already mastered. The objective of the instructional program for each participant is to teach to the areas of deficiency so that the student can reach the benchmark levels that he/she previously failed to attain. Time is not wasted teaching and reviewing concepts that the participant already has mastered.

As in the pre/post test method of evaluation, scores remain confidential. The company receives a report that indicates training recommendations for each participant. Table 3 on the next page provides an example of the educational provider's information obtained from a pre-test, followed by Table 4, a sample training recommendations report given to the company.

Table 3

Educational Providers Information
(based on pre-test - confidential)

Company XYZ
Math Assessment – Benchmark Levels

Whole Numbers ..... 8 of 10
Fractions ..... 7 of 10
Decimals ..... 7 of 10
Percents ..... 7 of 10
Data Analysis ..... 7 of 10

Educational Providers Information
(based on pre-test - confidential)

Participant	Whole Numbers	Fractions	Decimals	Percents	Data Analysis
John Doe	9	6	8	8	5
Jane Smith	8	4	7	5	8
Fred Jones	10	7	8	2	3

Table 4

Company XYZ
Reporting Training Recommendations

The training modules for each participant are recommended as follows:

John Doe ..... Fractions, Data Analysis

Jane Smith ..... Fractions, Percents

Fred Jones ..... Percents, Data Analysis

Another method used to report training recommendations/training effectiveness is through the use of individualized reports. Below is an example of a training recommendation report of Bill Taylor after completion of math training.

Company XYZ
Shop Math Training Recommendations

Name: Bill Taylor Date: March 23, 1994

Modules	Further Training Recommended?
Whole Numbers	No
Fractions	Yes
Decimals	No
Percents	No
Data Analysis	Yes

This method of evaluation is similar to the pre-/post-test method in that it utilizes one assessment tool to ascertain the participant's mastery of the material and allows for the confidentiality of the participant's score. It does, however, reveal those skill areas which the employee has and has not mastered. It is essential that the instructor create a positive rapport with the participants and reinforce the concept that the basic skills training is helpful – not punitive.

In addition to the advantage of allowing for a more efficient use of training time and dollars, it also targets the instructional needs of each individual to prevent feelings of boredom or frustration that result from being placed in a class that is too easy or too difficult. Companies receive a better picture of their workforce's skills and can use this information as they plan other training projects. (For example, if 80% of the participants tested have been recommended for math training, the company may choose to delay Statistical Process Control classes.)

The Module method of training evaluation is not without its drawbacks, however. Attempting to meet the needs of each individual by scheduling according to modules can become a logistical nightmare. In addition, instructors may find that they are providing individual tutoring within a whole class environment. Conducting this type of individualized instruction does not provide many opportunities for group interaction and is not the most efficient mode of training delivery.

Competency Checklist

As we continue to grow in our knowledge and delivery of workplace education programs, it has become evident that competency-based training is the most effective and efficient method of instruction. Competency-based (or performance-based) training is a systematic way of organizing instruction to ensure that learners become competent in tasks that have been designated as essential for success on the job.

Specifically, a competency-based curriculum includes the following (Stiles, Tibbetts, and Westby-Gibson, 1984):

- Success is demonstrated by measurable knowledge gained rather than by time put in.
- The specified competencies and their standards for successful performance are carefully identified, verified, and communicated to all parties concerned.

Instead of dealing with abstract concepts, competency-based instruction presents learning in real and concrete terms. It leads participants towards mastery of skills that are needed to function proficiently on the job. For these reasons, it has proven to be especially attractive to adults who may have unpleasant memories about their previous formal learning experiences.

To design an effective competency-based workplace skills training program, two critical steps must be taken at its initiation: 1) conduct a literacy audit to identify the job tasks and the basic skills required for those jobs targeted and 2) determine, with the company training committee or company contact, a set of general competencies to include in the curriculum. In the literacy audit, identified jobs will be analyzed to break down the tasks performed into smaller units. These units will then be prioritized based on their importance for successful job performance. Based on this information, lessons are developed that provide instruction in these targeted skills. Conducting the audit, analyzing the information, and reporting the findings can be time-consuming and eat up a large chunk of funds budgeted for program development. The upfront cost of conducting a thorough literacy audit and task analysis is worth the expense. A good literacy audit will provide a solid foundation for the development of the workplace curriculum and is necessary for the design of an effective program.

Competency-based instruction teaches to a pre-determined skill to be mastered. In this manner, competency-based instruction does "teach to the test." Lessons are developed that provide instruction and practice for those skills on which the participant will be tested. Similar, but never identical, practice exercises will be used in class. The mastery test determines the level of learning and transfer of the skill from the instructional material to the testing material. In this model, the competency-based testing takes place in the classroom setting. Taking this a step further, assessment can take place on-the-job to determine the mastery of skills that were identified as critical to proficient performance of a specific task. The proficient performance of the task and its components would indicate the transfer of the skill learned in the classroom setting to the actual workplace activity.

For adults in a workplace setting, competency-based training is a means to provide skill specific instruction in a relatively short amount of time. The companies are satisfied because the instruction focuses on the employees' work skills, and the employees are enthused to see a concrete application of the lessons taught.

The difficulty in conducting competency-based instruction and testing is the high degree of scheduling, recordkeeping, and reporting. Several issues of program design are: Should there be short modules to teach to a specific competency, or should a class focus on several competencies during a nine-week period? What about students who are in a nine-week course and have mastered several of the competencies that are being taught to this group? Do they receive the same instruction as the other students or should the instructor teach them competencies which they have not yet mastered? Should the instructor break the large group setting into smaller groups, or is one-on-one tutoring possible within the group?

Records to support mastery of specified competencies should also be maintained. It is suggested that an individual portfolio be kept on each student that contains all paper/pencil mastery tests, performance checklists, or anecdotal notes that back-up the assessor's rating of competency mastery.

Each participant's evaluation report (or competency report) should be simple, yet informative. Over the last six months, we have experimented with several different formats for reporting competency mastery levels. The most effective and "user-friendly" report format that we have developed involves rating the participant's performance of the competency as Nonmastery (N), Partial Mastery (P) or Mastery (M). The instructor should go over each individual's performance and provide counseling on strengths and weaknesses. The company will also receive a competency report for each individual, with the mastery test scores remaining confidential.

Tools for Measuring Learning

Tool	Strengths	Weaknesses	Useful Under the Following Conditions
Pre/Post Assessment and Percent Improvement	✦ Simplicity ✦ Objectivity ✦ Confidentiality	✦ Does not describe mastery ✦ Does not prescribe a course of further training ✦ Increase may be affected by "practice" effects ✦ Pre-test may discourage participants ✦ Percent improvement can be misleading ✦ Can encourage teaching to the test	✦ The company and participants value the amount of learning ✦ Time is available for pre-and post-testing ✦ Adequate instruction time for measurable learning to take place ✦ Scores and percent improvement can be kept confidential ✦ Participants are not discouraged by testing
Module completion	✦ Effecient use of training time ✦ Prescritpive recommendations for training ✦ Confidential assessment scores	✦ Little opportunity for including other skills and/or topics ✦ Management knows skill level of participants ✦ Difficult to schedule individualized training plans	✦ Specific training outcomes are defined ✦ Assessments and curriculum are available for each outcome ✦ It is possible to schedule individualized learning plans ✦ It is agreed that management can have access to each employees' skill level
Competency Checklists	✦ Learning presented in real and concrete terms ✦ Job-related ✦ Focused instruction ✦ Individualized reports	✦ High degree of record-keeping and reporting ✦ Require effective and valid measurements for each competency	✦ Competencies have been articulated and agreed upon ✦ Assessment measures exist ✦ Opportunity for additional training to improve mastery is available

Project recommendations:
For the measurement of learning we recommend the following:

1. Module completion is practical only when there is a concise and well-defined list of skills to be taught and it is possible to utilize individualized scheduling. The only basic skills content area with which we have been able to use module completion effectively is math.

2. Competency checklists are preferable to pre/post assessment because of the reasons indicated earlier. A post-assessment can be used, as well as portfolios and task performance, to document the achievement of the competencies. (See Exhibit 5 for a sample of a competency checklist.)

3. Because of the value of measuring basic skills as they apply to specific work situations, we recommend customized assessments. (See Exhibit 6 for an excerpt from a customized assessment.)

Exhibit 5

Workplace Communication Competencies
February, 1994 — June, 1994

Name:_____ Date:_____

N — Nonmastery of Competency
P — Partial Mastery of Competency
M — Mastery of Competency

ORAL COMPETENCIES

1. Describes job responsibilities at in a clear, concise manner. ____
2. States the correct abbreviations used for various products and procedures. ____
3. Describes his/her production process. ____
4. Relates various problems which may arise during machine operation. ____
5. Describes corrective actions. ____
6. Describes the work order — including all abbreviations, types of steel, pounds required, skids required, when customer needs order, etc. ____
7. Describes finished product and what happens to finished product at end run. ____
8. Lists the attributes of the steel used at his machine (ie. type, gage, finish, dyes and weight). ____
9. States preventative maintenance. ____
10. Describes how the thickness of steel is measured. ____
11. Describes math concepts used in steel production at ____
12. Names the various departments. ____
13. Names the supervisors and managers of each department. ____
14. States the location of various stock. ____

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15 Names the functions of the various departments at _____

16 Describes the importance of teamwork. _____

17. Relates the importance of quality. _____

18 Describes the general goal of ISO 9000. _____

19. Defines various TQM terminology such as: _____
   a. internal customer
   b. external customer
   c. supplier
   d. total quality management
   e. commitment to quality
   f. teamwork
   g. customer satisfaction
   h. flow charting
   i. excellence in productivity

20. Explains various policies: _____
   a. vacation
   b. sick leave
   c. leave of absence
   d. tardiness
   e. overtime

21. Explains the importance of flow charts, bar graphs, line graphs and pie graphs. _____

READING AND WRITING COMPETENCIES

22. Reads and comprehends textbook materials and various handouts (independent and handouts) presented in class. _____

23. Answers, in short concise sentences, questions related to text, handouts and materials. _____

24. Uses a dictionary to define workplace vocabulary. _____

25. Constructs a graph on depicting his/her monthly household expenses. _____

26. Reads and comprehends various TQM literature related to graphs and flow charting. _____

27. Writes job responsibilities in a sequential manner. _____

28. Fills out Maintenance Request forms. _____

29. Reads and interprets work order forms. _____

30. Reads, comprehends and writes all abbreviations used in production processes. _____

Exhibit 6

IV. Answer the following questions.

7. What is the name of the department for the job schedule shown below?

_____

8. Which jobs are scheduled to ship on 8/6/93? (List by job number.)

_____

JOB SCHEDULE 00-ENGIN 01-ENGIN.REPEATS 05-OUTSIDE SHEARING
10-SHEAR 15-PUNCH 45-FORM
08/12/93 50-SPOTWELD 55-WELD 75-PAINT
100-SHIPPING 999-HOLDING BETWEEN ENG & SHEAR

PRIORITY	DEPT.	JOB#	CUSTOMER	DESCRIPTION	SHIP DATE	II'S CHG	COMMENTS	ENGINEER DUE DATE
	50	3563	BLANKET	2 BR1040 RACK W/CASTERS	06/24/93		JOB #5436	
	50	2890	BLANKET	MISC PROJECTOR CARTS	06/25/93		FOR JOB #5437	
	50	3563	BLANKET	1 BR1040 RACK W/CASTERS	07/02/93		JOB #5432	
	50	5346	BLANKET****	24 SETS SD 48 I 76-1/4	07/02/93		FOR STOCK	
	50	5447	BLANKET	LBU 10 I 90 UPRIGHTS	07/09/93			
	50	3564	USPS	1 W-1-78 ACT TAG RACK	07/16/93		JOB #5546	
	50	3563	BLANKET	1 M-4-91 ACT TAG RACK	07/19/93		JOB #5430	
	50	5512	DESKS	5 KS22984 W/5 SHELVES	07/21/93		BLANKET #3454	
	50	3454	BLANKET	7-KS22984 CABINETS	07/21/93		7 NEEDED JOB #5512 & 5634	
	50	3564	USPS	1 F-2-78 ACT TAG RACK	07/31/93		JOB #5573	
	50	5638	BLANKET	100 BOTTOM SHELVES W/RETAIN	08/04/93			
	50	5457	USPS	6 BR-1040 W/CASTERS	08/04/93		BLANKET #5637	
	50	5521	OFFICE INT	5 RDBC363015 BOOKCASE	08/06/93		CHANGED TO SDBC ISSUED NEW JOB	
	50	5669	BLANKET	29 SETS REPLACE MUSEUM DRS	08/06/93		SENT OUT 8/6 FOR POWDER COATING	
	50	5479	MODERN OF	11 SETS SD 36I88-1/4 W/STO	08/09/93		BLANKET #5465	
	50	5663	ATLANTIC BUS	2 R4118 RECYCLING SORTERS	08/13/93		BLANKET #3797	
	50	5580	BLANKET	10 RDW186425	08/13/93			
	50	5214	CRETORS	30- 4-WHEEL WAGON FRAME	08/16/93			
	50	3563	BLANKET	2 M-4-91 ACT TAG RACK	08/20/93		JOB #5560 + 2 BR1040	
	50	5550	USPS	2 BR1040 NO CASTERS	08/20/93		BLANKET #5637 W/M-4-91	
	50	5490	MODERN OFF	8SD 30I100-1/4&1-36I100-1/4	08/20/93			
	50	2926	BLANKET	110 #200 BOOKCASES	08/20/93		45 NEEDED	
	50	5519	UNITED BUS	1 SET SD 36 I 64-1/4	08/20/93			
	50	5690	STORAGE	4 SETS 48 I 88-1/4	08/20/93		BLANKET #5320	
	50	5572	USPS	1 BR1040 NO CASTERS	08/20/93		BLANKET #5637	
	50	5684	BRADFORD	1 SET SD 42 I 85-1/4	08/20/93		BLANKET #4885	
	50	5691	SPACESAVER	4 SETS SD 42 I 88-1/4	08/20/93		BLANKET #4646	
	50	5575	STARE	1 R42118 RECYCLING SORTER	08/23/93		BLANKET #3797	

VIII. Daily Job/Cost Card

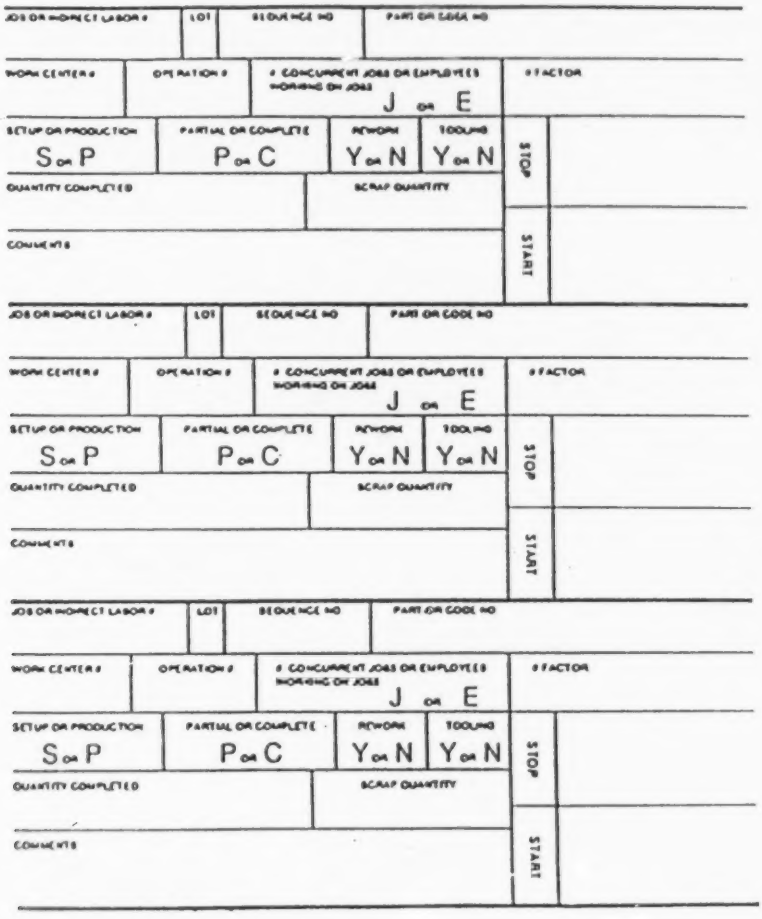
You make a set-up from 7:00 AM to 7:40 AM, you run production from 7:40 AM to 8:50 AM, and you do rework from 8:50 AM to 9:00 AM. This is for Job # 5000.

14. Fill out the Viking Daily Job/Cost Card completely, indicating the following:

a. Job #
b. Dept. # (Put in your dept #)
c. Operation #
d. Employee #
e. Set-up time
f. Run time
g. Rework time

VIKING DAILY JOB/COST CARD

EMPLOYEE NUMBER _____



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Level 3: Transfer of Learning

The purpose of the third level is to measure the degree of application of the new skills to the job. While virtually every program measures the amount of learning at the end of the course, few attempt to measure how much of that learning is being utilized on the job.

This level of evaluation offers the program the opportunity to demonstrate its value to the organization. While providing data on the job, it can also be a necessary link to measuring the impact on the organization. By showing a positive effect on the job, this level of evaluation can also facilitate the support of supervisors and managers in continuing the program.

There are several difficulties in successfully measuring this level. In the ideal situation, specific documentation regarding the application of basic skills is needed before the training as well as after the training. If the purpose of the course is to provide workers with the reading skills necessary to comprehend the written job aids, the program should be able to note and record how often the job aids are accessed prior to the training. After the training, data should be collected regarding how often the job aids are then accessed and comparisons made of the difference before and after the training. Ideally, it would be possible to measure and compare "the before" with "the after."

Realistically, such data is not available to collect because it is time-consuming and possibly disruptive to the flow of work. It also places value on certain tasks which may not in actuality be valued. For example, if a worker needs certain information regarding how to operate a machine, he or she can access a job aid or a co-worker. While the program may emphasize the importance of accessing the job aid, in actuality accessing a knowledgeable co-worker may be more time-efficient as well as more effective. Therefore, the ability to access the job aid may be less important than the ability to access the co-worker.

Performance checklists are one tool for recording usage of skills on the job. A performance checklist lists the steps which are carried out to perform a task. An observer then visits the worker, notes the task being performed, and completes the checklists. All checklists are then analyzed to determine how well the skills are being applied.

If such data is not available for collection and analysis, the next best step is to measure the "perception" of the transfer of learning. This can be the perception of the workers themselves as well as other people involved such as lead workers, team workers, supervisors, or managers.

One tool is the **survey** which can be given to supervisors to complete about the workers who participated in the training. While this tool can be subjective in nature, it is a very quick and convenient method for obtaining feedback on performance. One cautionary note is in order for using this tool. If the program is voluntary and if the workers know that the supervisor will be more closely examining their work, the use of surveys may act as a "dis-incentive" to participation in the program.

Another tool is the **interview**. An interview or a focus group of supervisors can provide feedback on the transfer of skills. Interviews are more open than surveys although they, by their very nature, require more supervisors' time and more program time to analyze and compile the results.

Both the survey and the interview can also be used as tools for **self-appraisal.** Workers themselves should be given the opportunity to reflect on the application of the training. Such realistic feedback can also be very useful in validating or revising the curriculum.

The project has found that the most promising tool for transferability of skills is the **performance indicator rating instrument.** Such an instrument is customized developed by the supervisors themselves. A facilitator guides the supervisors in identifying indicators of performance. The next step is to develop observable measures typical of highly competent, average, and less-than competent workers. A 3- or 5-point rating instrument is developed which supervisors then complete. The assumption behind the performance indicators is that basic skills in an integral part of the performance.

Performance appraisal ratings can be another tool. The major drawback to the use of these instruments is that they are usually completed annually and usually at the anniversary date of employment. Neither may be appropriate in terms of the participation in or conclusion of the training.

The following chart summarizes the strengths and weaknesses of each tool.

Tools for Transfer of Basic Skills

Tool	Strengths	Weaknesses	Useful Under the Following Conditions
Performance checklists	✦ Objective ✦ Job-related	✦ Requires a solid job task/ basic skills upon which to develop the checklist ✦ May be difficult to develop ✦ Likely to require a skilled observer to administer ✦ May require extended time to administer ✦ May be disruptive to the workflow ✦ Could dis-incent some workers from participating in the program	✦ Performance checklists are a part of the existing supervision system ✦ Skilled staff are available to develop and administer ✦ Workers and other staff are agreeable to their use
Participant questionnaires	✦ Can provide anonymous feedback ✦ East to collect data ✦ Can be customized	✦ Subjective	✦ Workers have the basic skills to complete the questionnaires ✦ Completion is regular and consistent ✦ Responses are easy to compile and analyze
Participant interviews	✦ Encourages wide variety of responses	✦ Subjective ✦ Requires time to schedule ✦ Requires a skilled facilitator and reporter ✦ Some staff may not be willing to openly share perceptions	✦ Time is available ✦ A skilled facilitator and reporter is available ✦ Staff are positive about sharing perceptions ✦ An interpreter is available if needed

Tools for Transfer of Basic Skills

(continued)

Tool	Strengths	Weaknesses	Useful Under the Following Conditions
Co-worker, supervisor, manager questionnaires	✦ Can allow for anonymous feedback ✦ Easy to collect data ✦ May encourage program support ✦ Can be completed during non-production time	✦ Subjective ✦ Requires that everyone understand the purpose of the program and the relationship to the job ✦ Requires time to complete ✦ Could dis-incent workers from participating in the program	✦ Completion is regular and consistent ✦ Responses are easy to compile and analyze
Co-worker, supervisor, manager interviews	✦ May encourage program support ✦ Encourages wide variety of responses	✦ Subjective ✦ Requires time to schedule ✦ Requires a skilled facilitator and reporter ✦ Some staff may not be willing to openly share perceptions	✦ Time is available ✦ A skilled facilitator and reporter is available ✦ Staff are positive about sharing perceptions
Performance indicator rating instruments	✦ Developed by the company staff ✦ Job-related	✦ Requires time to develop ✦ Requires a skills facilitator	✦ Time is available ✦ A skilled facilitator is available ✦ Staff can be trained to observe and fill out the instrument consistently
Performance appraisals	✦ Are an established part of the system	✦ Needs to include basic skills in the appraisal process ✦ Supervisors must be trained to observe and note use of basic skills ✦ Infrequent usage	✦ Effective, consistent appraisal system is in existence ✦ People completing the appraisals have the knowledge to rate basic skills

Exhibit 7

Training Impact Survey

Employee's Name: _____ Class: _____

Supervisor's Name: _____ Date: _____

Please evaluate the employee's on-the-job skills and performance as a result of his/her recent participation in a Basic Skills class. Return this completed form to _____ by _____. Thank you for your cooperation.

Work Competencies	Yes	No	Not Sure	Not Applicable
1. Has the employee's production increased?				
2. Has the employee's scrap or rework been reduced?				
3. Has the employee been involved in an accident/injury during this training period?				
4. Has the employee's self-confidence noticeably increased?				
5. Has the quality of the employee's work improved?				
6. Was the employee promoted during or after this training period?				
7. Has the employee become more effective in teamwork roles?				
8. Has the employee's participation in staff/department meetings increased?				
9. Does the employee exhibit a more positive attitude about the company and his/her job?				
10. Has the number of communication problems with the employee decreased?				
11. Does the employee speak English more often to you, other supervisory personnel and/or co-workers?				
12. Has the employee's writing skills improved?				
13. Has the employee's computation and measurement skills improved?				

Exhibit 8

Sample Performance Indicators Developed By Supervisors

The following is an excerpt of performance indicators developed by supervisors at one company. The facilitator of these indicators was Jorie Philippi of Performance Plus Consultants, Inc. Listed below is a summary of actual comments from Focus Group Discussions at one company.

II. Quality-Consciousness

5	4 3	2 1
Talks about specific measurements and uses quality terms	Expresses concern about doing a job the right way	Makes many errors on the job
Doesn't rush through a job or take short cuts	Uses correct kinds of math when needed for the situation	Passes on bad parts without checking or correcting them or telling anyone
Checks work thoroughly throughout process to ensure accuracy	Performs procedure to the best of his/her ability	Makes errors in simple math or record keeping
Figures out the cause of a problem		Cannot use quality terms or data
Has a low reject rate		Is unaware of the right information to ask for

III. Working with Others

5	4 3	2 1
Pitches in to help others with problems	Does what he is supposed to do	Is unable to adjust to other co-workers
Offers to help others when done with own job	Shows an open-minded attitude	Complains constantly
Listens to everyone's concerns	Displays cooperative behaviors when in a group	Argues
Shows respect for opinions of others		Seldom speaks to others
Makes helpful suggestions		Jumps to conclusions quickly
Is aware of differences and tries to work out good compromises		Sees only one side of any problem
		Blames others for problems
		Refuses to help others unless told he/she has to

Project recommendations:
The project recommends the following:

1. Administering and compiling the results of supervisor surveys is valuable to the program. Besides giving feedback on the skills transfer, it actively involves the supervisors in the program. (See Exhibit 7 for a sample survey).

2. If time permits, development of performance indicator rating instruments is the most valuable tool. (See Exhibit 8).

3. Participants' own perceptions of the effect of the training is also important. Their feedback can be elicited during the training as well as after the training.

Level 4: Organizational Impact

The fourth level of evaluation addresses the issue of organizational impact. The fundamental question that is raised is, "How well is the basic skill program adding value to the strategic direction of the organization?" This is not an easy question to answer. The degree of difficulty, however, should not inhibit the pursuit of an agreed upon analysis of impact.

Company-wide basic skill programs have two major operational challenges. The first is to provide the strategic planning, mobilize the human and financial resources, gain the commitment and communicate the vision to begin the basic skills initiative. The second great challenge is to sustain the effort over a long period of time. It is to this second challenge that the measurement of organizational impact has a direct line. In our experiences, first, second and third level evaluation data are enough to sustain a basic skills program for the first year or so. Positive employee feedback, a boost in morale, positive results from pre/post-assessments, competency checklists, and verified job relevance may be enough. Combine that with some sort of subsidy to assist with the cost of training and you have a formula for success in the initial stage of development. Longevity will, in large part, depend upon the degree to which the basic skills program can be linked to organizational strategic initiatives.

Cost Benefit Analysis

Many companies want to know if the basic skills program is having any impact on the bottom line. To answer this question in financial terms requires that a cost-benefit analysis be performed. A calculation is made that takes into consideration the amount of money that improved employee performance saves or generates for the company. In order to make the computation, pre/post data must be available. In addition, there may be a need to establish a control group or site that could construct a baseline. Typical production performance indicators are listed in Table 1. Additional cost-benefit analysis information could be calculated by determining the costs that would have been made had the basic skills program not been in place. Conducting a cost-benefit analysis can be a good thing to do especially if there is a high correlation to the performance measure. The problem is that most continuous quality improvement initiatives do not improve because of a singular reason. For example, scrap rates are usually reduced because a more efficient process was put into place or new equipment was purchased. Effective training on the new equipment or process was a critical element to scrap reduction and basic skills was a critical prerequisite to the success of the training.

Linking Basic Skills To Strategic Initiatives

Establishing the linkage between the basic skills program and the company's strategic direction must be established early. Up-front planning should occur that takes into account the "big picture." What is happening in the organization? Are there external forces that are having an impact on the business? What continuous improvement efforts are going on and how does a basic skills program fit in? The key to measuring organizational impact is: 1) tying the program to measures, and 2) ensuring that all levels of evaluation are linked in a logical chain.

Organizations that take into account strategic issues and link those issues with measures and behaviors get off to a much better start than those that do not. There is always the concern over

a basic skills program that starts because there is a grant or because the competition is doing it. The value is neither established nor is it linked to any measures or behavior changes.

An example of a company getting off to a good start would be one that is embarking on a Total Quality effort. Teams whose main focus is reducing quality failure costs are deployed. One of the recommendations from the teams is to implement a statistical process control program. The skill requirements versus the current skill levels indicate a gap. A basic skills program is implemented that focuses on math skills and writing for corrective action. The basic skills initiative is linked to a larger quality issue. If quality failure costs in this example are reduced, then this is a direct link between the cost savings and the basic skills program. If not for the success of the SPC program, failure costs would not have been reduced. If not for the employees monitoring the system and maintaining control charts, SPC could not have been implemented. If not for the basic skills instruction, control charts could not have been maintained.

The rules of evidence for establishing organizational impact will be different in every company. What matters most is that the linkage of basic skills to strategic issues is clear and agreed upon. Measuring impact inside companies is not the same as convincing the scientific community. Is it important that you attribute 15% of a cost of quality reduction to a basic skills initiative? No, but it is important to establish that the basic skills program was a necessary component of a larger training strategy. There should be a job analysis that clearly shows where employees need to perform and where they are performing now. Basic skills instruction is one strategy to fill the gap. If the linkage is clear, then it is our position that the percentage of improvement is not important.

Another recommendation is to tie the basic skills program to the actual performance unit or closest to the point of implementation. Using the SPC example mentioned above, a company increase in net profits attributed to the basic skills program would be too diffuse. Cost savings in the Fabrication Department where the SPC program is located, would be more appropriate and convincing.

There are several performance indicators that can be considered when linking basic skill efforts to company continuous improvement initiatives. As mentioned previously, increases in financial/market performance (sales growth, profitability, market share) for most companies would not be a compelling linkage. Strategic planning goals and objectives tied to customer or industry recognition are improvements in operation and probably more appropriate and easier to agree upon. Table 1 is a list of possible performance indicators and measures.

Table 1

Performance Indicators and Measures

1. *Customer or Industry Recognition*

Customer-Supplier Award or Recognition
- ✦ Ford Q1
- ✦ GM Targets for Excellence

ISO 9000 Certification Industry Quality Awards
- ✦ Malcolm Baldrige

Customer Satisfaction
- ✦ surveys
- ✦ letters
- ✦ other forms

2. *Operational Improvements*

Customer Delivery
- ✦ Reductions in order-to-delivery lead times
- ✦ On-time delivery rates

Production Efficiency
- ✦ Labor productivity (units produced per employee or labor hour)
- ✦ Reductions in changeover or setup time
- ✦ Capacity utilization
- ✦ Value-added per employee
- ✦ Efficiency (actual vs. planned) in launching of new product lines
- ✦ Labor utilization

Costs of Quality
- ✦ Scrap rates
- ✦ Customer returns
- ✦ Rework costs

Maintenance
- ✦ Reductions in unscheduled down time
- ✦ Reductions in response and repair times and costs

Material Management and Control
- ✦ Reduction in work-in-process inventories
- ✦ Reductions in error rates in production of company reports

Employment Costs
- ✦ Employee turnover, attendance/absenteeism
- ✦ Workers' compensation costs

Sales and Customer Service
- ✦ Average length of order-to-delivery lead times
- ✦ Average variance between quoted and actual delivery dates
- ✦ Percentage of orders not meeting quoted delivery date
- ✦ Percentage change in sales of product, not lines, etc.

Tools for Measuring Impact

Tool	Strengths	Weaknesses	Useful Under the Following Conditions
Cost-benefit analysis	✦ Quantifiable ✦ Commonly used tool in training	✦ Difficult to isolate costs ✦ Difficult to provide a cost figure to the benefits ✦ Requires quantifiable data which can be tracked to the cost as well as the program ✦ Dependent on no other factors affecting the outcomes	✦ The cost of a lack of basic skills can be determined ✦ The services provided by the program can be costed ✦ The impact of the program can be documented and costed ✦ No other factors have influenced the impact
Linking basic skills to strategic initiatives	✦ Basic skills programs are recognized as an integral part of the company ✦ Relevant to TQM ✦ Utilize current cost of quality data ✦ Variety of performance indicators	✦ Does not attribute a specific monetary benefit from the program ✦ Dependent upon well-articulated strategic plans	✦ The company has implemented a TQM initiative ✦ The company has established a cost of quality and regularly measures it ✦ The data is available for analysis

Project recommendations:
For the measurement of impact, we recommend the following:

1. In our experience with this project, cost-benefit analysis has not proven to be reliable for the following reasons. First, it is difficult to establish a cost for the lack of basic skills, as well as to establish a cost for the program services, especially when the services are partially grant-supported. Second, many factors contribute to the cost of problems. Third, cost data is difficult to isolate or, because of its proprietary nature, it is not available. Fourth, data may not be available as to individual participants' performance. (This is especially true in work-team environments and when participation in the program has been voluntary.)

2. Valuing basic skills according to strategic initiatives offers the greatest promise of measuring impact. Utilizing costs of quality data in those companies who are beyond the first stage of TQM adoption and tracking the value of the basic skills program can lead to validation of the importance of basic skills programs. This is a promising practice which we highly recommend for field-testing and one which we will be using in future projects. (See Exhibit 9.)

Exhibit 9

Example of a Performance Indicator Report

ABC Corporation is a medium-sized manufacturer. The company has been rapidly changing over the last five years. The average order size, lead time, and profit margin is half of what it used to be. ABC developed two strategies to improve the company's performance.

The first phase of ABC's strategy was to ensure that the plant and equipment would match the needs of their customers. ABC invested in high speed processing equipment to guarantee quick response to customer needs.

The second phase of ABC's strategy was to fully utilize their greatest untapped asset, their employees. ABC needed all its employees to understand how these strategies affected their areas of responsibility and what changes would be needed to capitalize on them. To strengthen their ability to react, they needed a better educated, more flexible workforce. The best catalyst for this strategy would be the TQM process.

In September of 1992, ABC started on the unending process of continuous improvement. To be successful, they felt they needed a program that was fully integrated for each area of the business. An aggressive schedule to train all employees in how the business intended to operate was established.

The program assessed and then provided training to bring each department of the organization to the desired skill levels to ensure that the TQM process would be successful. Like many manufacturing companies in Illinois, ABC is a melting pot of cultures and languages, which meant that extensive training of virtually every employee would be necessary. Employees had the difficult task of completing both their regular job duties and attending the training program. To eliminate objections to the training, union employees participated in training either before or after their regular shifts in paid overtime sessions.

The training plan included these basic skills courses:

- Basic Shop Math
- Reading
- English as a Second Language

The basic skills courses played an integral role in developing employees' skills to participate in further training such as Quality Management Skills training, SPC, and Team Leader Training.

Both the basic skills and the technical training took place over 18 months and resulted in over 265 hours of training representing over 8,000 man hours. A tutor/mentor program has been developed to augment the classroom training to provide additional customized, one-on-one training.

One clear focus resulted in both the intangible and tangible benefits for both the company and the employees. Some of the intangible benefits are:

- Greater employee participation/involvement.
- Greater cross-functional understanding and cooperation.
- Improved management skills.
- Improved communication.
- Focus on customer satisfaction.
- Higher level of education.
- Better and increased decision-making capability.
- Ability to empower workers.
- Employees taking more responsibility.
- More initiative.
- Higher level of trust.
- Increased job satisfaction and fun.
- Improved housekeeping.
- Transferable skills.

Specific company-wide performance indicators include:

- Improved overall product quality.
- Increased on-time delivery performance to 95%.
- Increased inventory accuracy, approaching 99.5%.
- Lowered internal scrap and handling damage 25%.
- Sales have increased dramatically.
- Increased safety, over one year with no lost-time accidents.
- Decreased Workers' Compensation Insurance premiums.
- Numerous vendor of the year or quality awards by customers.

The basic skills program was deemed an essential component to achieving this initiative and an important contributor to improving the company's performance.

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